

numerous changes can be made by those skilled in the art, such changes are encompassed within the spirit of this invention as defined by the appended claims.

[0033]        What is claimed is:

1. A method of treating a subterranean zone penetrated by a well bore comprising the steps of:

(a) preparing or providing a subterranean zone treating fluid comprising an aqueous fluid and an additive for preventing the swelling and migration of formation clays in said subterranean zone selected from the group consisting of 1-carboxy-N,N,N-trimethyl methanaminium chloride, 2-hydroxy-N,N,N-trimethyl ethanaminium acetate, and 2-hydroxy-N,N,N-trimethyl 1-propanaminium acetate; and

(b) introducing said treating fluid into said subterranean zone.

2. The method of claim 1 wherein said additive in said treating fluid is 1-carboxy-N,N,N-trimethyl methanaminium chloride.

3. The method of claim 1 wherein said additive is present in said treating fluid in an amount in the range of from about 0.1% to about 2.0% by weight of said aqueous fluid in said treating fluid.

4. The method of claim 1 wherein said aqueous fluid in said treating fluid is selected from the group consisting of fresh water and salt water containing dissolved salts in no greater a concentration than about 3.5% by weight of said salt water.

5. The method of claim 1 wherein said treating fluid further comprises a viscosity increasing gelling agent.

6. The method of claim 5 wherein said viscosity increasing gelling agent is selected from the group consisting of galactomannan gums, modified or derivatized galactomannan gums, cellulose derivatives, xanthan biopolymer, succinoglycon biopolymer, polyacrylamides and polyacrylates.

7. The method of claim 5 wherein said viscosity increasing gelling agent is selected from the group consisting of hydroxyethylcellulose, hydroxypropylguar, guar and anionically charged carboxymethylguar, carboxymethylhydroxypropylguar, carboxyethylguar and carboxymethylhydroxyethylcellulose.

8. The method of claim 5 wherein said gelling agent is anionically charged carboxymethylhydroxypropylguar.

9. The method of claim 5 wherein said viscosity increasing gelling agent is present in said treating fluid in an amount in the range of from about 0.12% to about 0.96% by weight of said aqueous fluid in said treating fluid.

10. The method of claim 5 wherein said treating fluid further comprises a cross-linking agent for cross-linking said gelling agent and further increasing the viscosity of said treating fluid.

11. The method of claim 10 wherein said cross-linking agent is selected from the group consisting of borate releasing compounds, a source of titanium ions, a source of zirconium ions, a source of antimony ions and a source of aluminum ions.

12. The method of claim 10 wherein said cross-linking agent is present in said treating fluid in an amount in the range of from about 0.01% to about 1.0% by weight of said aqueous fluid in said treating fluid.

13. A method of fracturing a subterranean zone penetrated by a well bore comprising the steps of:

(a) preparing or providing a subterranean zone fracturing fluid comprising an aqueous fluid, a viscosity increasing gelling agent and an additive for preventing the swelling and migration of formation clays in said subterranean zone selected from the group consisting of 1-carboxy-N,N,N-trimethyl methanaminium chloride, 2-hydroxy-N,N,N-trimethyl ethanaminium acetate, and 2-hydroxy-N,N,N-trimethyl 1-propanaminium acetate;

(b) introducing said fracturing fluid into said subterranean zone at a rate and pressure sufficient to form one or more fractures in said zone; and

(c) recovering said fracturing fluid from said zone.

14. The method of claim 13 wherein said additive in said treating fluid is 1-carboxy-N,N,N-trimethyl methanaminium chloride.

15. The method of claim 13 wherein said additive is present in said treating fluid in an amount in the range of from about 0.1% to about 2.0% by weight of said aqueous fluid in said treating fluid.

16. The method of claim 13 wherein said aqueous fluid in said treating fluid is selected from the group consisting of fresh water and salt water containing dissolved salts in no greater a concentration than about 3.5% by weight of said salt water.

17. The method of claim 13 wherein said viscosity increasing gelling agent is selected from the group consisting of galactomannan gums, modified or derivatized galactomannan gums, cellulose derivatives, xanthan biopolymer, succinoglycon biopolymer, polyacrylamides and polyacrylates.

18. The method of claim 13 wherein said viscosity increasing gelling agent is selected from the group consisting of hydroxyethylcellulose, hydroxypropylguar, guar and anionically charged carboxymethylguar, carboxymethylhydroxypropylguar, carboxyethylguar and carboxymethylhydroxyethylcellulose.

19. The method of claim 13 wherein said gelling agent is anionically charged carboxymethylhydroxypropylguar.

20. The method of claim 13 wherein said viscosity increasing gelling agent is present in said treating fluid in an amount in the range of from about 0.12% to about 0.96% by weight of said aqueous fluid in said treating fluid.

21. The method of claim 13 wherein said treating fluid further comprises a cross-linking agent for cross-linking said gelling agent and further increasing the viscosity of said treating fluid.

22. The method of claim 21 wherein said cross-linking agent is selected from the group consisting of borate releasing compounds, a source of titanium ions, a source of zirconium ions, a source of antimony ions and a source of aluminum ions.

23. The method of claim 21 wherein said cross-linking agent is present in said treating fluid in an amount in the range of from about 0.01% to about 1.0% by weight of said aqueous fluid in said treating fluid.

24. A subterranean zone treating fluid composition comprising an aqueous fluid and an additive for preventing the swelling and migration of formation clays in said subterranean zone selected from the group consisting of 1-carboxy-N,N,N-trimethyl methanaminium chloride, 2-hydroxy-N,N,N-trimethyl ethanaminium acetate, and 2-hydroxy-N,N,N-trimethyl 1-propanaminium acetate.

25. The composition of claim 24 wherein said additive in said treating fluid is 1-carboxy-N,N,N-trimethyl methanaminium chloride.

26. The composition of claim 24 wherein said additive is present in said treating fluid in an amount in the range of from about 0.1% to about 2.0% by weight of said aqueous fluid in said treating fluid.

27. The composition of claim 24 wherein said aqueous fluid in said treating fluid is selected from the group consisting of fresh water and salt water containing dissolved salts in no greater a concentration than about 3.5% by weight of said salt water.

28. The composition of claim 24 wherein said treating fluid further comprises a viscosity increasing gelling agent.

29. The composition of claim 28 wherein said viscosity increasing gelling agent is selected from the group consisting of galactomannan gums, modified or derivatized galactomannan gums, cellulose derivatives, xanthan biopolymer, succinoglycon biopolymer, polyacrylamides and polyacrylates.

30. The composition of claim 28 wherein said viscosity increasing gelling agent is selected from the group consisting of hydroxyethylcellulose, hydroxypropylguar, guar and anionically charged carboxymethylguar, carboxymethylhydroxypropylguar, carboxyethylguar and carboxymethylhydroxyethylcellulose.

31. The composition of claim 28 wherein said gelling agent is anionically charged carboxymethylhydroxypropylguar.

32. The composition of claim 28 wherein said viscosity increasing gelling agent is present in said treating fluid in an amount in the range of from about 0.12% to about 0.96% by weight of said aqueous fluid in said treating fluid.

33. The composition of claim 28 wherein said treating fluid further comprises a cross-linking agent for cross-linking said gelling agent and further increasing the viscosity of said treating fluid.

34. The composition of claim 33 wherein said cross-linking agent is selected from the group consisting of borate releasing compounds, a source of titanium ions, a source of zirconium ions, a source of antimony ions and a source of aluminum ions.

35. The composition of claim 33 wherein said cross-linking agent is present in said treating fluid in an amount in the range of from about 0.01% to about 1.0% by weight of said aqueous fluid in said treating fluid.